

# THE USE OF PHOTODIODES FOR THE DETECTION AND SPECTROMETRY OF NUCLEAR RADIATION

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The physical properties and technology of silicon photodiodes are similar to the ones of surface barrier semiconductor detectors. We have investigated since 1975 the use of photodiodes with different physical properties for the detection and spectrometry of nuclear radiation. Schottky barrier and diffusion type photodiodes were investigated. The depleted region for these photodiodes is usually between 100 and 500  $\mu\text{m}$ . Good diode characteristics and homogeneity of the front evaporated contact were observed. The photodiodes were tested with radiation sources. The photodiodes were used in conjunction with a modified Canberra 970-D preamplifier. The energy resolution achieved for photodiodes of different areas is shown in Table I.

Table I. Energy resolution of photodiodes (FWHM in keV)

Source of radiation	Energy (keV)	Area of photodiodes		
		1 $\text{cm}^2$	6 $\text{cm}^2$	3,2 $\text{mm}^2$
$\alpha$ - $^{241}\text{Am}$	5 477	12.1	48	-
$\beta$ - $^{113}\text{In}$	363	7	-	-
X, $\gamma$ - $^{57}\text{Co}$	6.4; 14.43	-	-	1.9
X- $^{55}\text{Fe}$	5.9	-	-	0.28*

\* measured with detector and first stage of the preamplifier cooled with liquid nitrogen

The above results indicate that some types of photodiodes are comparable in energy resolution to the best available surface barrier detectors.